

JUN -- 09/750,221
Client/Matter: 082123-0275721

AD

In general, an image sensor captures an image by using the response characteristics of a semiconductor device to incident light. An object optically imaged on an image sensor has its brightness and wavelength converted electrical signals representing brightness and wavelength on a pixel by pixel basis. A particular brightness and wavelength cause the image sensor to produce [[a]] particular electrical signals having defined values characterizing the image qualities.

Page 1, delete the whole paragraph starting in line 18 and replace it with the following new paragraph:

AB

The image sensor has a pixel array including tens of thousands to hundreds of thousands of unit pixels. Several thousand converting units convert analog voltages provided by the pixels into [[a]] digital signal representations of those voltages. Tens of thousands to hundreds of thousands of storage units store the converted digital voltage signals. Due to the considerable number of pixels and the various converting units, it is easy for a pixel [[or]] converter unit [[to]] in a manufactured image sensor to be bad, thereby causing erroneous imaging.


Page 3, delete the whole paragraph starting in line 2 and replace it with the following new paragraph:

AC


This known arrangement has an operational drawback. During the mass-production test process, the test process of extracting the position information of the defective pixel is complex ~~to result~~ and results in a prolonged processing time for the test. In addition, since an image sensor production company has to offer an additional non-active memory having the position information of the defective pixel to a corresponding system industrial, the prior art has a shortcoming that it increases the unit cost of production.

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Page 3, delete the whole paragraph starting in line 9 and replace it with the following new paragraph:

 The inventions claimed herein feature, at least in part, According to one aspect of the present invention an apparatus is provided which is capable of detecting and compensating for defective pixels on a real time basis. The apparatus uses a two-dimension space filter and characteristics of image data, without an additional non-active memory, thereby simplifying test processes for the image sensor and enhancing yield of the image sensor chip.

Page 3, delete the whole paragraph starting in line 14 and replace it with the following new paragraph:

 One exemplary embodiment features an apparatus, in a image sensor including a pixel array in which a multiplicity of unit pixels are aligned, each of which outputs digital image data corresponding to a characteristic of incident light, such as, for example, intensity. There is provided an arrangement for detecting and compensating for defective pixels among the multiplicity of unit pixels. This arrangement includes a defect pixel detection block for detecting and determining whether a target pixel is defective based on a check condition. One such exemplary condition is that value of image data of the defective pixel is larger than a first coefficient ~~corresponding to the~~ times a maximum value of image data of adjacent normal pixels or a value smaller than a second coefficient ~~corresponding to the~~ times a minimum value of image data of adjacent normal pixels. A defect pixel compensation block compensates the image data of the defective pixel and outputs compensated image data. Compensation is responsive to the image data of a check target pixel, the maximum value of image data of ~~[[a]]~~ adjacent normal pixels, the minimum value of image data of adjacent normal pixels, a defective pixel determination signal representing that the target pixel is defective, and a minimum or maximum range violation signal representing that the image

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data of the defective pixel violates predetermined maximum or minimum ranges in the check condition, which are provided thereto from the defective pixel detection block.

Page 4, delete the whole paragraph starting in line 8 and replace it with the following new paragraph:

A7

Exemplary embodiments illustrating the principles of the ~~claimed inventions~~ present invention will be described in detail with reference to the accompanying drawings, in which:

Page 5, delete the whole paragraph starting in line 9 and replace it with the following new paragraph:

A8

The defective pixel detection block 210 checks to determine whether a value of the image data of the check target pixel satisfies a predetermined condition. If the checked result is negative, the defective pixel detection block 210 determines that the corresponding pixel is defective and outputs the defective pixel determination signal. One such predetermined check condition that can be used by defective pixel detection block 210 is based on a characteristic that most defective pixels have a value of 1.1 times or larger ~~[[as]]~~ than the maximum value of image data of adjacent normal pixels or a value of 0.9 times or smaller than the minimum value of image data of adjacent normal pixels. Simultaneously, the defective pixel detection block 210 outputs a maximum range violation signal and a minimum range violation signal representing that the image data of the defective pixel violates a range of the maximum value, i.e., the image data has a value of 1.1 times or larger than the maximum value of image data of adjacent normal pixels, and the image data of the defective pixel violates a range of the minimum value, i.e., the image data has a value of 0.9 times or smaller than the minimum value of image data of adjacent normal pixels.

Page 7, delete the whole paragraph starting in line 16 and replace it with the following new paragraph:

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AA Although the preferred embodiments of the invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.